

What is claimed is:

1. A method of producing parts from powdered metal comprising the steps of:
 2. a) providing a metallurgic powder comprising iron, 0.3-1.0 weight percent carbon, 0-4.0 weight percent chromium, 0-3.0 weight percent copper, 0.5-1.5 weight percent molybdenum, 0.5-4.5 weight percent nickel, 0-1.0 weight percent manganese, and 0-1.5 weight percent silicon, the weight percentages calculated based on the total weight of the powder;
 8. b) compressing the metallurgic powder at a pressure of 30 to 65 tons per square inch to provide a compact;
 10. c) heating the compact to 1400 °F to 2000 °F for 20 to 60 minutes;
 11. d) cooling the compact at a rate of 10 °F to 120 °F per minute;
 12. e) grinding the compact to produce a detailed surface geometry;
 13. f) heating the compact to 2000 °F to 2400 °F for 20 to 80 minutes; and
 14. g) cooling the compact at a rate of 120 °F to 450 °F per minute.
1. 2. The method of claim 1, wherein the parts are sprockets.
1. 3. The method of claim 2, wherein the sprockets have a tooth density of 6.7 g/cc to 7.2 g/cc.
1. 4. The method of claim 1, wherein the metallurgic powder is compressed in step b) to produce a compact with a density of 6.5 g/cc to 7.25 g/cc.
1. 5. The method of claim 1, wherein the compact is cooled in step d) to produce predominantly Pearlite, Ferrite + Pearlite, or Bainite microstructures.
1. 6. The method of claim 1, wherein the grinding in step d) is form grinding or profile grinding.

1 7. The method of claim 1, wherein the compact is ground in step e) to produce a surface
2 geometry selected from the group consisting of sawtoothed, undercut, and tapered.

1 8. The method of claim 1, wherein the method includes an additional step after step g) of
2 heating the compact to 300 °F to 1000 °F for 30 to 90 minutes.

1 9. The method of claim 8, wherein the produced compact is a tempered compact with a
2 microstructure of greater than 90% Martensite, 0 to 3% Pearlite, and less than 7%
3 retained Austenite.

1 10. A method of producing parts from powdered metal comprising the steps of:

2 a) providing a metallurgic powder comprising iron, 0.8 weight percent
3 carbon, 2.0 weight percent copper, 1.25 weight percent
4 molybdenum, 1.4 weight percent nickel, and 0.42 weight percent
5 manganese, the weight percentages calculated based on the total
6 weight of the powder;

7 b) compressing the metallurgic powder at a pressure of 45 tons per square
8 inch to provide a compact;

9 c) heating the compact to 1650 °F for 30 minutes;

10 d) cooling the compact at a rate of 25 °F per minute;

11 e) grinding the compact to produce two rows of teeth with a groove in
12 between the two rows;

13 f) heating the compact to 2070 °F for 30 minutes; and

14 g) cooling the compact at a rate of 150 °F per minute.

1 11. The method of claim 10, wherein the parts are sprockets.